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STS.011 American Science: Ethical Conflicts and Political Choices  
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# Cape Wind<sup>SM</sup>

Energy for Life.

[www.capewind.org](http://www.capewind.org)

# Who is Cape Wind?

## Energy Management Inc (EMI)

- **Massachusetts energy company, founded in 1977**
- **Energy conservation, efficiency & pollution control**
- **Energy generation: 6 natural gas plants, 1 biomass plant in 1980's – 1990's**
- **Filed permit applications for Cape Wind, November, 2001**

## **Energy Demand & Supply Choices**

**Energy demand is expected to increase 40% between the years 2000 and 2025. Energy efficiency improvements and new power sources are needed.**

*Options for new power sources include:*

- **Nuclear** power plants
- **Coal & Oil** power plants
- **Natural Gas** power plants
- **Renewable** energy projects

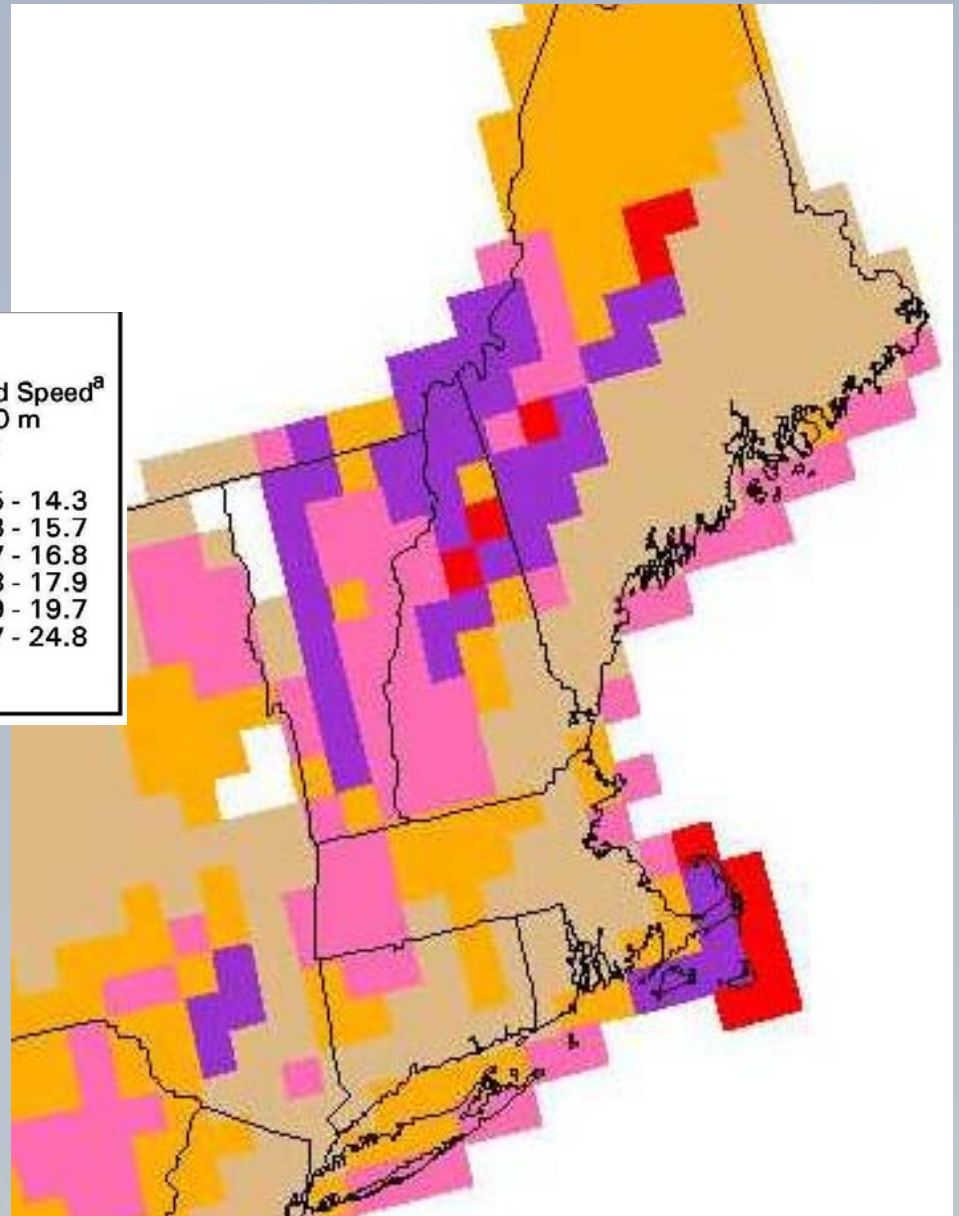
# Wind Power – renewable leader

- **Substantial improvements** in design & performance.
- **Fastest growing energy source** in the world.
- Increasingly **cost competitive** with fossil fuels.
- **Fifteen years of successful experience in Europe with ocean based turbines.**
- Large offshore wind farms in Denmark, others being built in UK, Ireland, Holland, Spain, and Germany.

### Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m <sup>2</sup>	Wind Speed <sup>a</sup> at 50 m m/s	Wind Speed <sup>a</sup> at 50 m mph
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

<sup>a</sup> Wind speeds are based on a Weibull k value of 2.0





# wind power, an old Cape tradition



# Middlegrunden offshore project





## Why Horseshoe Shoal?

**Nantucket Sound is ideally suited for offshore wind energy development:**

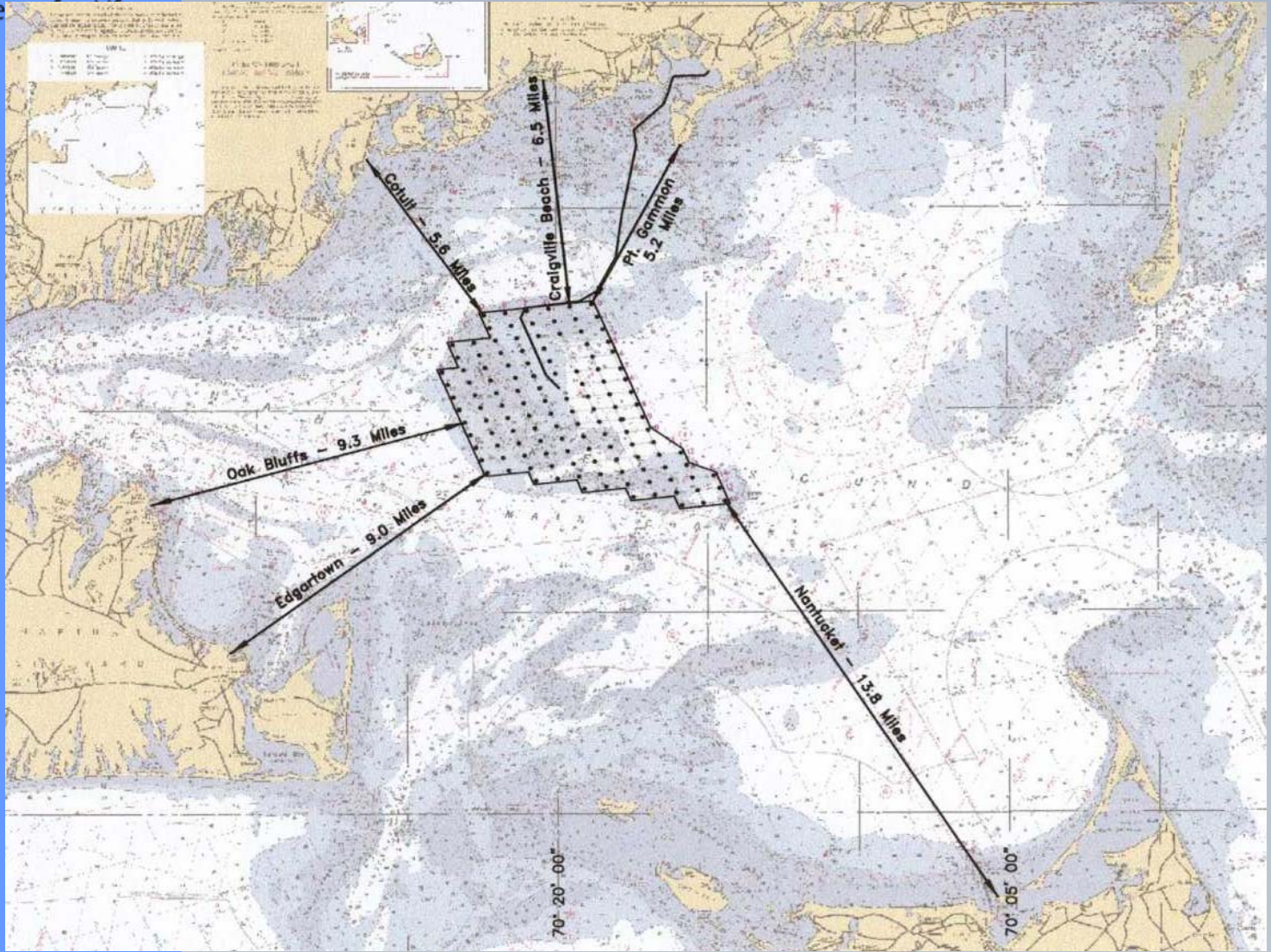
- strong winds
- low wave heights
- shallow water in Horseshoe Shoal
- proximity to area of high electric demand

# Cape Wind Project Description

- **130 Wind turbines producing up to 420 megawatts of clean renewable energy and producing 182 megawatts on average**
- **Turbines are 258' tall, highest blade tip of 440' tall, turbines are spaced 6 to 9 football fields apart Horseshoe Shoal still open to boating**
- **Cape Wind will fund decommissioning**
- **Cape Wind will make lease payments to be shared by the Federal Government & MA**



# Proposed Site



# Visual Simulation from Cotuit





# Low impact installation technology

- Driven monopole foundations to minimize seabed disturbance
- Jet-plow cable embedment of submarine transmission cables
- Horizontal directional drill at landfall transition
- Underground installation of overland cable

# Scientific Monitoring Device Station





# Avian Radar Barge

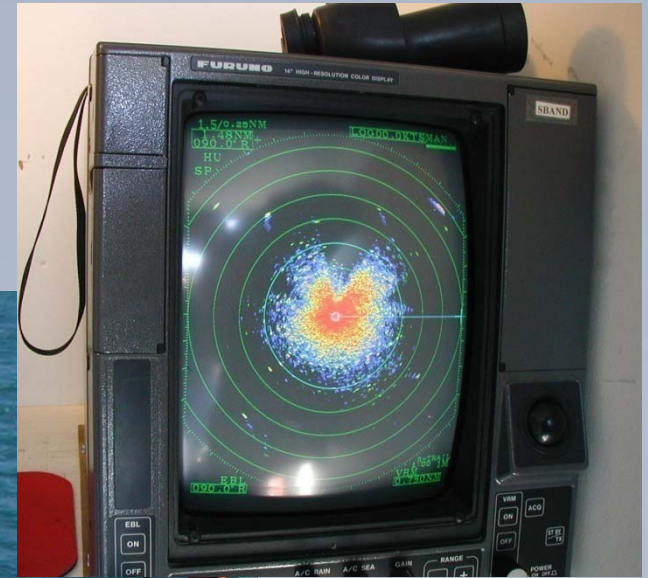


9 December 2008

[www.CapeWind.org](http://www.CapeWind.org)

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# Avian Radar



# Cape Wind – 2001

- **Permit Application filed 11/15/01**
- **Responding to state and federal policy initiatives to encourage companies to develop renewable energy projects**
- **Policies support renewable energy because:  
Clean air / environmental benefits, energy independence, jobs, fuel diversity, stable prices**



# Energy Updates 2001 - 2007

- **Electricity prices have doubled**
- **Increasing concerns about our dependence on unstable & dangerous parts of the world for supplying our Oil & LNG**
- **Fossil fuel supplies are tight – easily disrupted by wars, political instability, weather events...(*New England is at the end of the supply line*)**
- **China & India emerged as major demand centers**

# Another consequence of our energy imports – Buzzards Bay Oil Spill, 2003



# **Environment, 2001 – 2006**

## **increasing concerns on Cape Cod**

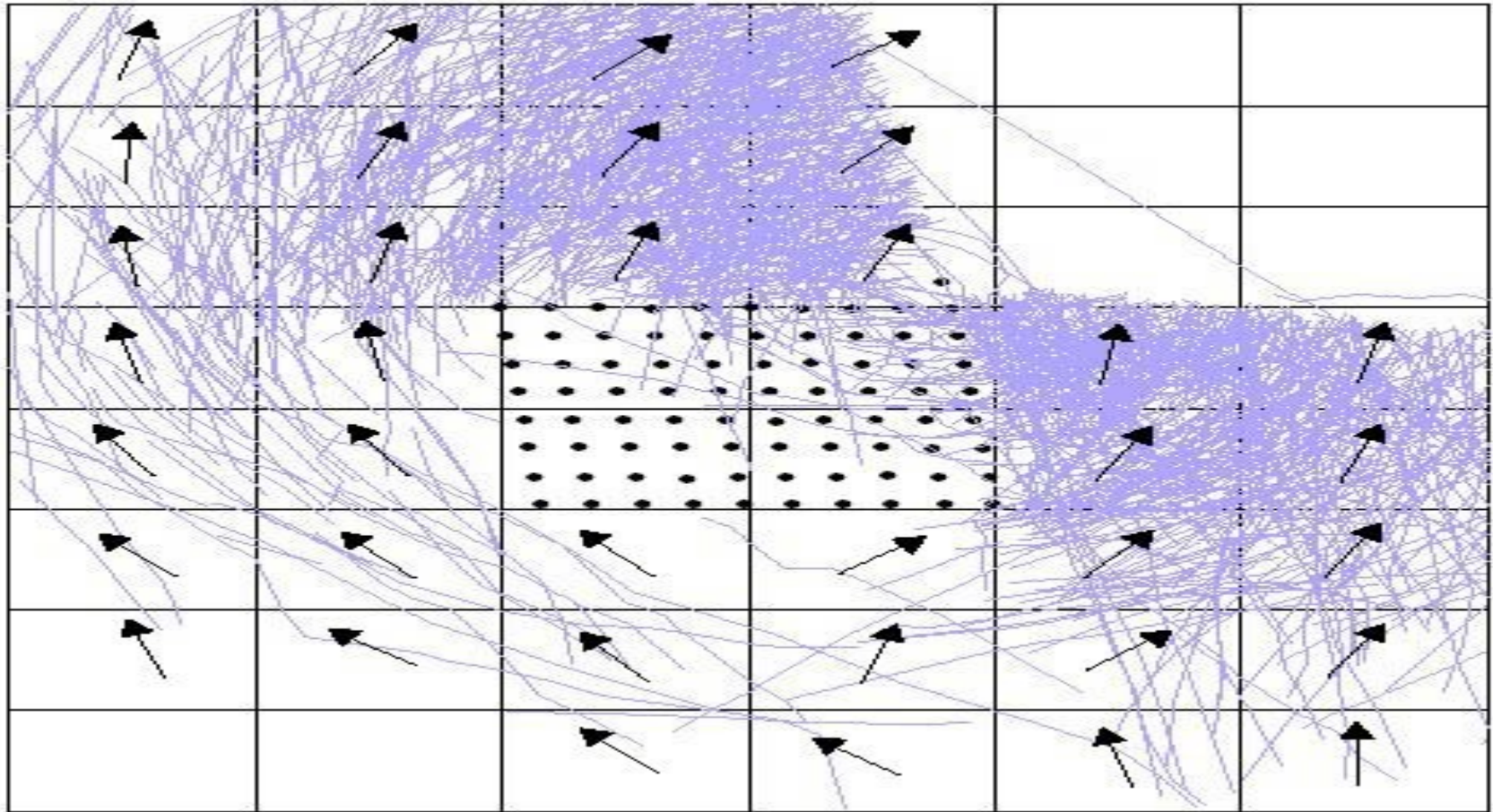
- **According to US EPA & the American Lung Association, Barnstable County had the worst air quality in Massachusetts in 2002, 2003 & 2004 (*2005 report due out soon*)**
- **Increased acceptance of global warming as major problem, induced by greenhouse gas emissions like carbon dioxide**
- **According to scientists at Woods Hole, erosion problem on Cape & Islands is expected to get much worse due to rising sea levels**



# Offshore wind power 2001 - 2007

## European wildlife studies

## Radar Map of Bird Avoidance Behavior at Horns Rev



This figure shows all individual flight-tracks of birds recorded by radar at the Horns Rev offshore wind farm during the 2004 spring migration. The arrows show the average flight direction in each grid cell coverable by radar.

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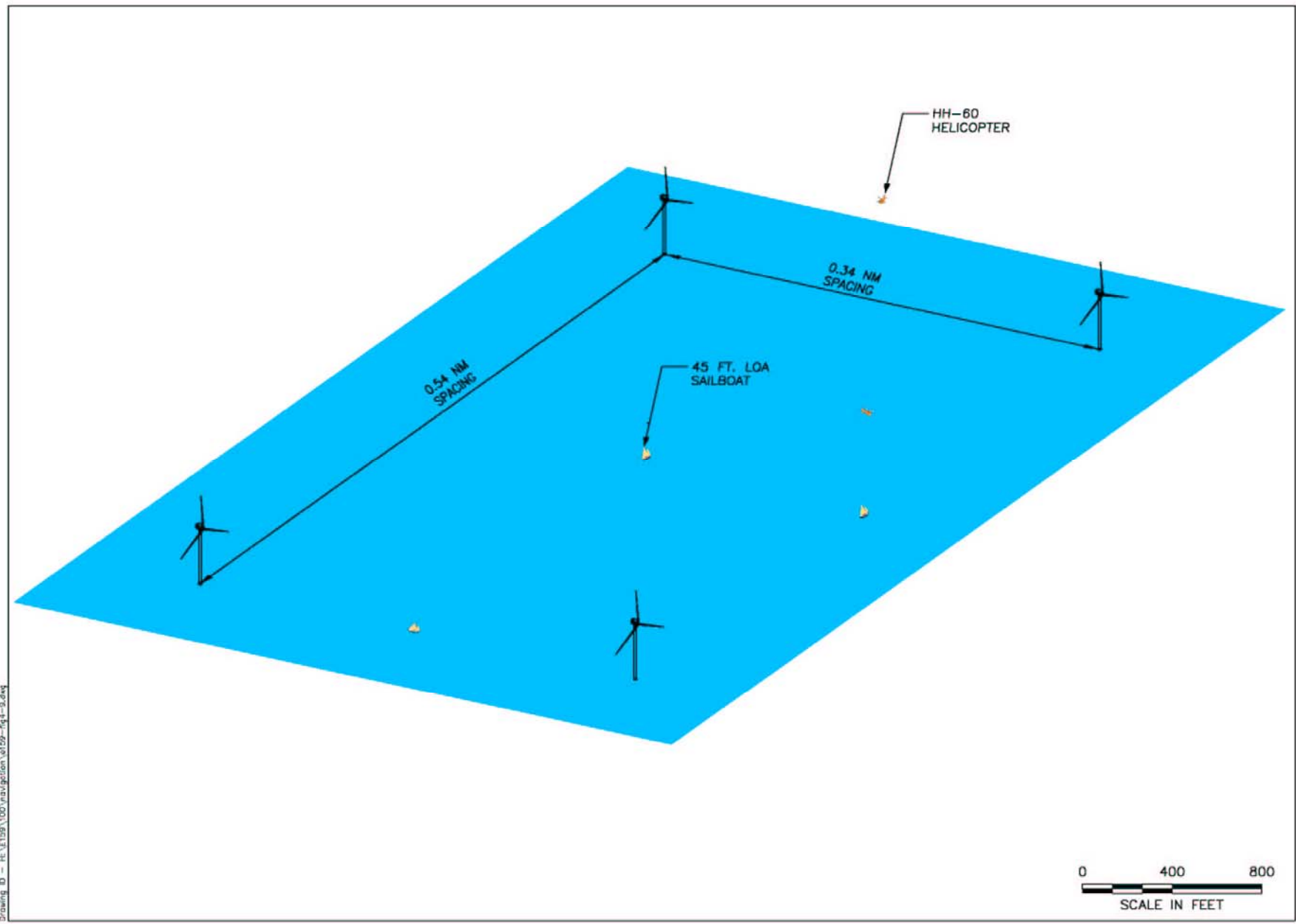
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# Marine growth covers wind turbine foundation, Horns Rev

Photo of starfish on Horns Rev turbine foundation removed due to copyright restrictions.

# Navigation



WTG Grid Spacing in Isometric View

Figure 4-4-9

Drawing: B1 - REV. 0159 \000\Navigation\0129-fig-4-9.dwg

## MTC Stakeholder Process Findings

- Cape Wind's electricity will “follow the path of least resistance and be used primarily on Cape & Islands, providing  $\frac{3}{4}$  of the local demand.
- Cape Wind's electricity will reduce operations of fossil fuel power plants, reducing fossil fuel imports and lowering air pollution emissions.
- Cape Wind will help reduce and stabilize otherwise rising electricity prices.

# Who Decides? The Permitting Process...

- **Seventeen agencies** conducting a **Public Interest Review** using the National Environmental Policy Act and the Massachusetts Environmental Policy Act.
- **Tougher** environmental permit **review** than required of any coal, oil, or gas power plant in New England.
- The **review will include** alternative site analysis, project impacts on benthic, fish, marine mammals, avian, economic impacts, fishing, aesthetics...



# ACOE DEIS

**Provides independent verification of project benefits:**

- **Reduced air pollution, reduced fossil fuel imports**
- **Economic benefits, jobs, economy**
- **Not a threat to sea or air navigation**
- **No major impacts to ecology of shoal**

# Minerals Management Service (MMS)

**Congress authorized MMS to regulate and approve offshore wind in the Energy Policy Act of 2005 – transferred Lead Federal Agency Role from ACOE to MMS.**

## Massachusetts Energy Facilities Siting Board, Approval Decisions – 2004 & 2005

- Heard from both sides in **32-month process**
- **Approved** Cape Wind's electric cables
- Determined that Cape Wind would **reduce energy prices by 25 million dollars per year**
- “Overall, the Siting Board concludes that the **air quality benefits** of the wind farm are **significant, and important** for Massachusetts and New England”
- Authority supersedes Cape Cod Commission

## Annual Amounts of Fossil Fuel Offset by this Wind Power Project

- Oil - 113 Million gallons *or*
- Coal - 570,000 tons *or*
- Natural Gas - 10 Billion cubic feet

## Specific air quality benefits of Cape Wind

- Annual Emission Offsets (reductions):
  - Thousands of tons of SO<sub>2</sub> and NO<sub>x</sub> that harm human health
  - Over 770,000 tons of the greenhouse gas CO<sub>2</sub>

## **Ian Bowles, Massachusetts Secretary of Energy & Environment**

On greenhouse gas emissions, Cape Wind is like taking 175,000 cars off the road.

- *“Overall, the project represents a balanced and thoughtful commitment to action that will contribute to the long term preservation and enhancement of our environment.”*



# On the front line of Global Warming: Baxter Road, Nantucket



Courtesy of The Nantucket Independent, [www.nantucketindependent.com](http://www.nantucketindependent.com). Used with permission.

# Socio-Economic Impacts

- **600 – 1,000 new jobs** in SE New England for manufacturing, assembly and construction.
- **50-55 high paid, Cape-based jobs** for the permanent operation of Cape Wind.
- Massachusetts becomes **global leader** in offshore renewable energy
- **Reduced reliance on imported energy.**



## **SE New England – an offshore renewable energy leader**

- **Cape Wind would make region a global leader in offshore renewable energy**
- **Bright future in offshore wind, wave, tidal**
- **First-Mover Advantage**
- **Natural Strengths – Woods Hole, Mass Maritime, Renewables program at 4C's**



# Support for Cape Wind



- Major Environmental Organizations
- Organized Labor
- Health Organizations
- Thousands of Citizens



## Yes, Cape Wind has opponents too

- They tout criticisms of the DEIS by the Department of Interior
- But now, Interior is the LEAD Federal Agency
- Energy Policy Act – gave MMS explicit authority to grant easements for offshore wind and to charge a lease.
- Energy Act also called on Interior to approve more renewable energy projects on public lands.

*‘someone should write a book...’*

Book cover image removed due to copyright restrictions.

Whitcomb, Robert, and Wendy Williams. *Cape Wind: Celebrity, Class, Politics, and the Battle for Our Energy Future on Nantucket Sound*. Cambridge, MA: PublicAffairs, 2007. ISBN: 9781586483975.

## What's Next

- **Minerals Management Service EIS coming out next month!**
- **Complete permitting in 2008**
- **Obtain project financing – working with Lehman Brothers**
- **Construction will take about 2 years**

## **Cape Wind – the first of many**

**According to US Department of Energy:**

- **Over 900,000 Megawatts of offshore wind capacity, most of it is offshore northeast & mid-Atlantic states**
- **Most is in deep water, 10-20 years away**
- **Some shallow water projects doable now, like Cape Wind, will help accelerate process**



# Make your voice heard!

- Sign up for Cape Wind's updates on [www.capewind.org](http://www.capewind.org)
- Letters to the Editor
- Letters to elected officials, permitting agencies